Sampling and Analysis Plan – Environmental Sampling and Monitoring for Levee Zone Interim Cleanup Action

Former Maintenance and Fueling Facility

Skykomish, Washington

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May 3, 2006

Table of Contents

Table of Contents

List of Tables

List of Attachments

1 Introduction

This sampling and analysis plan (SAP) presents the project organization, objectives, and specific Quality Assurance (QA) and Quality Control (QC) activities associated with the collection and evaluation of environmental soil and sediment samples during the levee cleanup zone interim action for cleanup at the BNSF Railway Company's former maintenance and fueling facility in Skykomish, Washington. This SAP meets the requirements of the Model Toxics Control Act (WAC 173-340-820) and WAC 173-204, sediment management standards. All QA/QC procedures detailed in this SAP are in accordance with applicable professional technical standards, Washington Department of Ecology guidelines (Ecology, 1991, 1995), and project-specific goals. This SAP describes the procedures that will be implemented to ensure that the precision, accuracy, representativeness and completeness of the project data are sufficient to satisfy the project objectives.

This SAP pertains to soil and sediment samples that are collected as part of the performance monitoring (as defined in WAC 173-340410 (1) (a)) and stockpile characterization for the levee zone interim action for cleanup. Additional sampling for the National Pollutant Discharge Elimination System (NPDES) permit, compliance monitoring, and air monitoring will be detailed in other documents.

This SAP is an appendix to the Engineering Design Report Levee Zone Interim Action for Cleanup (EDR, RETEC, 2006). The EDR outlines remedial actions to which this SAP applies and presents a project schedule as required in WAC 173-340-820.

2 Project Organization

2.1 Project Structure

The organizational structure for the levee remediation phase of the project will consist of several RETEC staff. They include: a Client Service Manager, Project Manager, Regional Health and Safety Officer, Levee Remediation Chief Engineer, Site Safety Officer, Data Validator, and Support Staff. Additional members of the project team include, but are not limited to the laboratory coordinator, public relations officer, and Contractors.

2.2 Responsibilities of Project Personnel

The responsibilities of project personnel are described in the following paragraphs. In some cases one person may assume more than one role.

2.2.1 Client Service Manager

The Client Service Manager will be an alternate point of contact and will have responsibility for the overall success of the project. The Client Service Manager's duties will include:

- Project oversight and strategy development with project team. Provision of resources to allow completion of project
- Assist Project team as needed in negotiations, strategy development, and project deliverables.

2.2.2 Project Manager

The Project Manager (PM) will be the primary point of contact and will have responsibility for technical, financial, and scheduling matters. The PM's responsibilities will include:

- Ecology contact
- Assignment of duties to the project staff and orientation of the staff to the needs and requirements of the project
- Supervision of the performance of project team members
- Monitoring all aspects of the project to verify that all work is being completed in accordance with this SAP
- Budget and schedule control
- Establishment of a project record-keeping system.

2.2.3 Regional Health and Safety Officer

The Regional Health and Safety Officer (HSO) has the following responsibilities:

- Interface with the Project Manager as required in matters of health and safety
- Approve the site-specific Health and Safety Plan (HASP) for the project
- Amend the approved HASP as site conditions warrant
- Appoint or approve a Site Safety Officer (SSO) to assist in implementing the HASP
- Monitor compliance with the approved HASP
- Assist the Project Manager in ensuring that proper health and safety equipment is available for the project
- Approve personnel to work on the site with regard to medical examinations and health and safety training.

2.2.4 Levee Remediation Chief Engineer

The Levee Remediation Chief Engineer has the following responsibilities:

- Review all technical documents associated with the project for technical accuracy and feasibility
- Interface with the Project Manager as required in all technical matters
- Appoint or approve a Project Engineer to assist in approving invoices and working with the contractors
- Act as point contact for design work that has been subcontracted out, such as infrastructure and utilities and water management, and the general contractor (who will be a BNSF direct contract).

2.2.5 Project Engineer

The Project Engineer is responsible for assisting the Levee Remediation Chief Engineer.

- Reviewing subcontractors' work and approving all subcontractor invoices.

- Working with the subcontractors and analytical laboratories to ensure that all field activities are conducted appropriately and that field activities are properly documented.
- Coordinating the sampling operations to verify that the sampling team members adhere to this SAP.
- Providing daily schedules for field personnel including subcontractors.
- Maintaining a log for all work completed on site.
- Preparing the field investigation data and information for reports.
- Sending the analytical laboratory deliverables of performance sampling results to Ecology via electronic mail, or if the Ecology representative is on-site without electronic mail access, in hard copy. These deliverables will be sent immediately to Ecology if a timely response is to be requested of Ecology.

Note that it is not necessary for the Project Engineer to be present on-site during all sampling activities or field operations. Thorough coordination and communication with the sampling team members will ensure compliance with this SAP.

2.2.6 Public Relations Officer

The public relations officer will be an EnviroIssues employee. This officer will be the main contact for the public for the project. All comments, requests, questions and complaints should be directed to the Public Relations officer. If the Public Relations officer needs technical support, RETEC will be contacted and a member of the project team, likely the Project Manager, will provide technical input.

2.2.7 Quality Assurance Officer

The Quality Assurance (QA) Officer will be responsible for audits and monitoring adherence to the project QA objectives. The QA Officer reports directly to the Levee Remediation Chief Engineer. The QA Officer has the following responsibilities:

- Reviewing laboratory analytical data
- Coordinating QA/QC operation with the Laboratory Coordinator
- Providing the Data Validator with the laboratory analytical data and sampling field notes

- Informing the Levee Remediation Chief Engineer of whether soil excavation is complete in a given area per compliance monitoring data or whether additional excavation is required.

2.2.8 Site Safety Officer

The Site Safety Officer (SSO) will be responsible for verifying that project personnel adhere to the site safety requirements outlined in the HASP. These responsibilities will include:

- Conducting the health and safety training for project personnel as appropriate
- Modifying health and safety equipment or procedure requirements based on data gathered during the site work
- Determining the posting locations and routes to medical facilities, including poison-control centers, and arranging for emergency transportation to medical facilities
- Posting the telephone numbers of local public emergency services and facilities
- Performing site audits to verify adherence to the requirements of the HASP.

The SSO has authority to stop any operation that threatens the health or safety of the work team or surrounding populace. The daily health and safety activities may be conducted by the SSO or a designated replacement.

2.2.9 Laboratory Coordinator

The laboratory coordinator will be an employee at the analytical laboratory. Responsibilities of the Laboratory Coordinator will include:

- Collaborating with the Project Engineer in establishing sampling and analysis programs
- Serving as liaison between the laboratory and Project Engineer or QA Officer
- Serving as the “focal point” for laboratory activities
- Coordinating laboratory and data activities by the analytical services staff
- Notifying the laboratory and QA Officer of specific laboratory nonconformances and changes
- Maintaining a complete set of laboratory data

- Releasing testing data and results to the Project Engineer.

2.2.10 Data Validator

Responsibilities of the Data Validator will include:

- Identifying data to be classified as questionable or qualitative
- Comparing actual sampling and laboratory procedures to those outlined in this plan
- Reporting the validation results to the Project Engineer and QA Officer.

3 Excavation Performance Samples

3.1 Purpose

Excavation performance sampling will be performed at the limits of the excavation (with the exception of the southern side) to confirm that cleanup has been achieved in accordance with the compliance monitoring requirements in WAC 173-340-740, and WAC 173-204. The south side of the excavation will not be sampled since remediation will continue to the south at a future date. As discussed below (see 3.2: Sampling Locations), one discrete grab sample will be analyzed for excavation bottom and sidewall areas not to exceed 625 square feet.

Sediment is typically defined either as the upper 10 centimeters (the biologically active zone) or material below the ordinary high water mark, for the purposes of this SAP, sediments are defined as the solids which directly underlie the area beneath and waterward of the ordinary high water mark (OHWM). The OHWM was determined using a vegetation survey. The OHWM was staked and surveyed in the field. The OHWM elevation varies with distance along the river.

Excavations waterward of the OHWM will remove material exceeding the sediment cleanup level of 40.9 mg/kg NWTPH-Dx or extend at least 10 feet below the river bottom. If concentrations exceed 40.9 mg/kg NWTPH-Dx at the 10 foot depth below the river bottom, Ecology will be consulted regarding whether backfilling can be done or whether additional excavation is required. The uplands excavation less than 25 feet landward from the OHWM will remove material exceeding the soil cleanup level of 22 mg/kg NWTPH-Dx to a depth of at least 10 feet below the river bottom. NWPTH-Dx concentrations in material more than 25 feet landward of the OHWM must be less than or equal to the remediation level of 3,400 mg/kg NWTPH-Dx and excavations will be backfilled with clean material

3.2 Sampling Locations

Both exterior sidewalls and excavation bottoms will be sampled during the Levee Interim Action for Cleanup. Sidewalls and excavation bottoms will be sampled separately. For either sidewall or excavation bottom sampling, one discrete grab sample will be collected per 625 square foot area (25’ x 25’) or fraction thereof. Areas larger than 625 square feet must be subdivided into areas less than or equal to 625 square feet and one discrete grab sample will be collected from each of the smaller areas.

Grab samples will be collected from approximately the center of each area. Additional grab samples will be collected from any visually-impacted areas and analyzed separately.

Samples will be named in a systematic fashion. For example, sample "SKY-SOIL-A1" would be collected from row A, column 1 and any subsequent samples from the same location due to re-excavation based on the results of the previous sampling would be named "SKY-SOIL-A1-2," etc. Sediment samples would be named with SED (such as "SKY-SED-A2") if the sample is intended to meet sediment cleanup levels. This includes material waterward of the OHWM.

The location of the discrete grab samples will be determined as accurately as possible given the conditions present in the field at the time of the sampling and the surveying technique used (i.e., accuracy within a few feet is desired). For example, if the bottom of the excavation at the approximate location of a proposed sample is relatively dry, the location can be located relatively accurately using a hand-help global positioning system device at the time of sampling. On the other hand, if soil removal at a sample location involves removing soil in 8 feet of water so that it is not physically possible to stand on the proposed sample location, the sample location will be determined by measuring as accurately as possible with the surveying techniques at hand from existing features or from known benchmarks. Stakes will be placed at the perimeter of the excavation to mark the 25 foot grids. It will not be possible to obtain the same accuracy of a sample location where the sample is taken in standing water as compared to a sample location where the sample is taken on dry ground. The GPS survey will be used to map all samples collected in locations where the sample point can be logged by the GPS unit.

3.3 Environmental Sampling Procedures

Environmental sampling procedures for soil and sediment will be identical. These samples will confirm that the extents of the excavation have been achieved. Soil and sediment samples at the limits of the excavation will be collected as discrete grab samples from the excavation using a clean stainless steel trowel or shovel or may be collected directly from the excavator bucket during excavation. Should sampling from the bucket be impractical, for example, if a clamshell bucket is to be used, material from the bucket will be placed on a clean plastic liner and the sample will be collected from the pile using a clean stainless steel spoon or trowel or by hand using disposable gloves. If the sample can be collected directly from the excavation, the sample will be collected from the floor of the excavation to be representative of the material left in place. Surface materials that are not to be included in the sample (such as rocks, twigs, and leaves) will be removed before the sample is collected.

Sampling containers will be filled to minimize head space, and will be appropriately labeled and stored prior to shipment or delivery to the laboratory. Reusable sampling equipment such as stainless steel trowels and shovels shall be decontaminated between sample locations as described below. Sampling procedures will comply with RETEC Standard Operating

Procedure (SOP) 210 (Attachment A). Decontamination processes will comply with SOP 120 (Attachment A).

The water in the excavation may be allowed to clear prior to sampling, depending on the length of time it takes for this to occur. Any visible sheen and/or petroleum product will be removed by a skimming system and water will be removed by pumping water from within the excavation area to the National Pollutant Discharge Elimination System-permitted treatment system.

3.4 Chemical Analysis and Turn-Around Times

Excavation performance monitoring samples will be analyzed by NWTPH-Dx. Although other indicator hazardous substances exist for the Site, NWTPH-Dx has been selected as the surrogate analysis in consultation with Ecology as outlined in the Feasibility Study (RETEC, 2005). The upland area consists of all material landward of the OHWM. Sediment, as defined above, includes all material waterward of the OHWM.

Performance samples within the sediment area must meet the sediment cleanup level of 40.9 mg/kg NWTPH-Dx. If excavation within the sediment area reaches a depth of 10 feet below the river bottom and the 40.9 mg/kg NWTPH-Dx cleanup level is not met, Ecology will be consulted and the area may be backfilled as it may be protective of sediment.

Material less than 25 feet landward from the OHWM must meet upland soil cleanup standards to a depth of 10 feet below the river bottom. Beyond 25 feet landward, upland areas where soil remediation levels are applicable that are represented by samples with concentrations less than or equal to 3,400 mg/kg NWTPH-Dx will be backfilled following Ecology approval. If the concentration exceeds 3,400 mg/kg NWTPH-Dx, the 2,500 square foot area may be re-excavated an additional 2 feet and re-sampled. If the depth of the excavation prevents the 625 square foot area from being re-excavated, Ecology will be consulted and contingencies such as soil mixing may be used.

Rush turn-around times, such as 24-hours, may be requested for some of the samples collected depending on the staging of work within the Project Area. Once Ecology receives analytical data, they will have 24 hours (on a weekday basis) to respond with approval for backfill or selection of BNSF's proposed contingency actions. It may be necessary to perform work on weekends to meet the project schedule. If Ecology review of performance sample data and backfill approval will be needed on a weekend day, RETEC will make every effort to give Ecology 48 hours notice. RETEC will submit performance sampling data to Ecology upon receipt from the laboratory for portions of the excavation for which we are requesting approval to backfill.

4 Stockpile Sampling

4.1 Purpose

Excavated material will be field-screened and segregated based on final disposal or placement location. Clean overburden material will be classified as appropriate for backfill or designated for waste disposal off-site. Stockpiles will be separated to prevent cross-contamination. Stockpiles will be sampled before the material is used for backfill and as required by the waste management facility for disposal. The final sampling procedure for the backfill material will be established when the contractor provides a plan for filling and maintaining stockpiles and through coordination with the waste disposal facility. The sampling frequency and testing requirements of the stockpiles of impacted materials designated for disposal are set by the disposal company. Those details will be worked out with the disposal company at a later date.

4.2 Locations

Overburden stockpiles will be divided into volumes of 200 cubic yards as the material is stockpiled and the sections will be named sequentially (for example, the first 200 cubic yards would be referred to and labeled as Stockpile A, the second 200 cubic yards would be referred to and labeled as Stockpile B). A plan for filling and maintaining stockpiles will be developed with the contractor. Samples will be named based on the name of the stockpile (for example, "SKY-STOCK-A" will represent the first 200 cubic yards, "SKY-STOCK-B" the second 200 cubic yards).

4.3 Stockpile Environmental Sampling Procedures

Based on existing analytical data for the site, overburden material will consist of material removed from the levee above the road elevation and the upper four feet of the uplands. Four grab samples will be collected from each 200 cubic yard division of the stockpile and composited into one sample for laboratory analysis. An excavator will be used to cut a trench 3 feet normal to the pile surface at four locations equally spaced around the pile and the grab sample will be collected from the vertical mid-point within the trench.

Samples will be collected using equipment appropriate to the depth from which collection is to occur. The grab samples will be of equal volume and will be collected using a clean, stainless steel trowel of spoon. Samples may be collected directly from piles or from a shovel or excavator bucket. The grab samples will be homogenized in a decontaminated stainless steel bowl or in a disposable zip-lock type bag. Sampling containers will be filled to minimize headspace, and will be appropriately labeled and stored prior to delivery to the laboratory.

4.4 Overburden Stockpile Chemical Analysis and Turn-Around Times

Overburden stockpile samples will be analyzed for total petroleum hydrocarbons by NWTPH-Dx. Standard turn-around times will be requested since material will likely be suitable for backfill.

4.5 Disposal or Reuse as Backfill

In order to be considered clean, the concentration must be less than or equal to cleanup level, i.e., 22 mg/kg NWTPH-Dx in soil or 40.9 mg/kg NWTPH-Dx in sediment, or the laboratory's Practical Quantitation Limit (PQL) estimated to be approximately 35 mg/kg for NWTPH-Dx. If a sample concentration is clean, the volume represented by that sample can be used anywhere within the Project Area as backfill except as sediment in reconstruction of the river bed. If a sample concentration is clean, the volume represented by that sample may be stockpiled in a long-term stockpile area for use as backfill on the railyard during subsequent phases of remediation. Alternatively, excavated soils and sediments whose NWTPH-Dx concentrations are not clean may be screened and materials that are less than 1 inch in diameter will be designated under WAC 173-303 and disposed of at an appropriate facility. The screening operation is expected to remove most of the finer grained soil that may cling to oversized material, leaving the oversized fraction relatively free of impacts. The 1.0 inch and greater size material must pass visual inspection as having no visible contamination and be approved by Ecology for use as backfill in areas of the excavation greater than 25 feet landward of the OHWM.

Over-sized boulders & rip-rap will be reused in reconstruction of the levee if they pass visual inspection as having no visible contamination and are approved for reuse by Ecology. Rip-rap and boulders with visual contamination may be reused after steam cleaning. Photo-documentation of materials passing visual inspections will be maintained in the project records.

5 Sample Handling

5.1 Sample Handling

Analytical methods and requirements for soil and sediment are summarized in Table 6-1. Soil and sediment samples will be analyzed for the following constituents:

- Total Petroleum Hydrocarbons (NWTPH-diesel extended).

Table 5-1 Sample Handling and Preservation Requirements for Soil and Sediment

Parameter	Method	Container	Preservation	Holding Time Soil
TPH	NWTPH-Dx	8 oz. WMG	Cool to 4º C	14 days

Notes:
Container
WMG = wide mouth glass

5.2 Sample Packing and Labeling Procedures

Samples must be packed to prevent damage to the sample container and labeled to allow sample identification. All samples must be packaged so that they do not leak, break, vaporize or cause cross-contamination of other samples. Waste samples and environmental samples (e.g., soil, etc.) should not be placed in the same container. Each individual sample must be properly labeled and identified. A chain-of-custody record must accompany each shipping container. When refrigeration is required for sample preservation, samples must be kept cool during the time between collection and final packaging.

All samples must be clearly identified immediately upon collection. Each sample bottle label will include the following information:

- Client and project name
- A unique sample description (such as SKY-SOIL-A1 or SKY-STOCK-A)
- Sample collection date and time.

Additionally, the sample bottle label may include:

- Sampler's name or initials
- Indication of addition of preservative, if applicable
- Analyses to be performed.

After collection, the samples will be maintained under chain-of-custody procedures as described below.

5.3 Chain of Custody

Chain-of-custody procedures are intended to document sample possession from the time of collection to disposal. Chain-of-custody forms must document transfers of sample custody. A sample is considered to be under custody if it is in one's possession, view, or in a designated secure area. The chain-of-custody record will include, at a minimum, the following information:

- Client and project name
- Sample collector's name
- Company's (RETEC) mailing address and telephone number
- Designated recipient of data (name and telephone number)
- Analytical laboratory's name and city
- Description of each sample (i.e., unique identifier and matrix)
- Date and time of collection
- Quantity of each sample or number of containers
- Type of analysis required
- Addition of preservative, if applicable
- Requested turn-around times
- Date and method of shipment.

Additional information may include type of sample containers, shipping identification air bill numbers, etc.

When transferring custody, both the individual(s) relinquishing custody of samples and the individual(s) receiving custody of samples will sign, date, and note the time on the form. If samples are to leave the collector's possession for shipment to the laboratory, the subsequent packaging procedures will be followed. If an on-site lab is being used, a chain-of-custody must be completed but the following packing procedures do not apply. All samples will be stored appropriately by the lab.

5.3.1 Packing for Shipment

Packing of samples for shipment will comply with RETEC Standard Operating Procedure 110 (Attachment A). To prepare a cooler for shipment, the sample bottles will be inventoried and logged on the chain-of-custody form. At least one layer of protective material will be placed in the bottom of the container. As each sample bottle is logged on the chain-of-custody form, it should be wrapped with protective material (e.g., bubble wrap, matting, plastic gridding, or similar material) to prevent breakage. Each sample bottle should be placed upright in the shipping container. Each sample bottle cap should be checked during wrapping and tightened if needed. Avoid over tightening, which may cause bottle cap to crack and allow leakage. Additional packaging material such as bubble wrap or Styrofoam pellets should be spread throughout the voids between the sample bottles.

Most samples require refrigeration as a minimum preservative. If needed, reusable cold packs or ice placed in heavy-duty zip-lock type bags should be distributed over the top of the samples. Two or more cold packs or bags should be used to cool the samples to 4 to 6 degrees Celsius. Additional packing material should then be placed to fill the balance of the cooler or container.

Place the original completed chain-of-custody record in a zip-lock type plastic bag and place the bag on the top of the contents within the cooler or shipping container. Alternatively, the bag may be taped to the underside of the container lid. Retain a copy of the chain-of-custody record with the field records.

Close the top or lid of the cooler or shipping container and rotate/shake the container to verify that the contents are packed so that they do not move. Add additional packaging if needed and reseal. Place signed and dated chain-of-custody seal at two different locations (front and back) on the cooler or container lid and overlap with transparent packaging tape. The chain-of-custody tape should be placed on the container in such a way that opening the container will destroy the tape. Packaging tape should encircle each end of the cooler at the hinges.

Sample shipment should be sent via courier or an overnight express service that can guarantee 24-hour delivery. Retain copies of all shipment records as provided by the shipper.

Chain-of-custody records will be maintained in an appropriate file with the Project Manager. Copies of these records will be submitted in an appendix to the final report. Chain-of-custody information will also be recorded in field notebooks.

5.4 Sample Log-In

Upon receipt of samples (which will be accompanied by a completed chain-of-custody record detailing requested analyses), the Laboratory Coordinator(s) or his/her delegate will:

- Verify all paperwork, chain-of-custody records, and similar documentation
- Log-in samples, assign unique laboratory sample numbers, and attach the numbers to the sample container(s)
- Store samples in a refrigerated sample bank
- Record temperature upon receipt.

6 Analytical Procedures

The laboratories utilized for analysis of samples collected under the SAP shall perform all analysis according to EPA/Ecology-accepted methods. Accepted EPA methods consist of those methods that are documented in the "Contract Lab Program Statement of Work for Organic Analysis" or any alternative method that has been approved by EPA/Ecology for use during this project. The analytical method procedures are detailed in the laboratory QA manual.

6.1 Analytical Laboratories

A laboratory accredited by Ecology will perform analysis on all soil and sediment samples collected as described in this SAP.

6.2 General Requirements

In general, the laboratory will adhere to those recommendations as promulgated in 21 CFR Part 58, "Good Laboratory Practices" and procedures described in SW-846 Test Methods for Evaluating Solid Waste-Physical/Chemical Methods, Third Edition, 1994; and those criteria presented in 40 CFR 136.

6.3 Analytical Data Review

The QA Officer will perform a review of the data received from the analytical laboratory to ensure that all of the project QC criteria have been met. Every component of the data package will be inspected. A series of QC forms will be supplied by the laboratory with the analytical data package and will be used as part of the data review process.

The results of all environmental sampling will be sent to the Data Validator for validation. A report containing the results of the validation will be submitted to the QA Officer.

7 Quality Control and Quality Assurance

7.1 Quality Control of Soil and Sediment Sample Collection

At least one soil/sediment sample in every 20 will be field split for pseudoreplicated chemical analysis. Split samples will be collected by filling two sets of sample containers with the soils collected. Field splits will not be identified as splits on the sample labels or chain-of-custody forms but will be identified as such in the field notebook and the sample logs. A summary of the QA samples to be collected is summarized in Table 7-1.

Table 7-1 Summary of Quality-Assurance Soil and Sediment Samples

Matrix	Parameter	Equipment Rinseate Samples	Field Duplicates	Matrix Spikes
Soil	A	1 per 20 samples	1 per 20 samples	1 per 20 samples
Sediment	A	1 per 20 samples	1 per 20 samples	1 per 20 samples
Stockpiles for re-use as backfill	A	As required by waste management facility	1 per 20 samples	1 per 20 samples

Notes:
A –Field duplicate and equipment rinseate samples will be analyzed for the same parameters as the investigative samples.

7.1.1 Documentation

Various documents will be completed and maintained as a part of soil and sediment sample collection. These documents will provide a summary of the sample collection procedures and conditions, shipment method, analyses requested, and the custody history. These documents may include:

- Field books
- Soil sampling forms
- Sample labels
- Chain-of-custody forms
- Shipping receipts.

All documentation will be stored in the project files.

7.1.2 Decontamination

Decontamination is performed as a quality control measure and as a safety precaution. It prevents cross-contamination between samples and also helps maintain a clean working environment. All equipment which could potentially contact samples requires decontamination. This includes hand tools, monitoring and testing equipment, personal protective equipment, or heavy equipment (e.g., loaders, backhoes, drill rigs, etc.). All decontamination will comply with RETEC Standard Operating Procedure 120 (Attachment A).

Decontamination will be achieved by rinsing with liquids that may include: soap and/or detergent solutions, tap water, distilled water and methanol. Equipment may be allowed to air dry after being cleaned or may be wiped dry with paper towels or chemical-free cloths.

All sampling equipment will be decontaminated prior to use and between each sample collection point as outlined in SOP 120 (Attachment A). Waste products produced by the decontamination procedures such as rinse liquids, solids, rags, gloves, etc. will be collected and disposed of properly at an off-site licensed facility and shipment will comply with RETEC SOP 430 (Attachment A). Any materials and equipment that will be reused must be decontaminated or placed in plastic bags before being taken off-site.

All soil sample collection apparatus will be fully decontaminated before sampling and between sampling points. At least one equipment rinseate sample will be collected after decontamination for every 20 soil grab samples collected. Duplicate and equipment rinsate samples will be analyzed for the same constituents as the environmental samples. Excavator buckets will be rinsed out to the extent possible. Soil grab samples will be collected away from the walls of the excavator buckets to reduce possible cross-contamination.

The following are decontamination procedures for sampling equipment:

1) Remove gross visible solids from the equipment by brushing and then rinse with tap water.

2) Wash with detergent or soap solution (e.g., Alconox® and tap water).

3) Rinse with tap or distilled water.

4) Repeat entire procedure or any parts of the procedure if solids appear to still be present on the sampling equipment.

5) Rinse with distilled water.

6) After decontamination procedure is completed, avoid placing equipment directly on ground surface where recontamination is

possible. Spoons and trowel will be placed in clean plastic bags or wrapped in foil.

No additional decontamination procedures will be required if the equipment appears to be visually clean. If impacts are visible after hot water/steam cleaning, then a detergent wash solution with brushes (if necessary) will be used.

7.2 Quality Assurance Objectives

Quality assurance objectives help to achieve the data quality requirements required by the project. Soil and sediment samples will be collected for NWTPH-Dx analysis as described above in order to meet the objectives of the interim action for cleanup. To help achieve the data quality requirements, the following quality-control parameters will be evaluated throughout the course of this project:

- Detection limits
- Practical Quantitation Limits
- Data precision
- Data accuracy
- Representativeness
- Comparability and completeness.

These quality-assessment parameters are described in greater detail in the following paragraphs.

7.2.1 Detection Limits

The method detection limit for a given parameter is determined by procedures specified in the analytical method. Detection limits will be observed for all laboratory analyses performed during this project, except where matrix interferences and high concentrations of target and non-target compounds increase the reporting detection limits. Method detection limits for NWTPH-Dx at Test America Laboratories, the laboratory selected for this work, are listed in Table 7-2. Samples that are highly impacted visually in the field will be flagged for the laboratory to minimize dilution of the entire set of samples.

Table 7-2 NWTPH-Dx Method Detection and Practical Quantitation Limits

	Method Detection Limit (mg/kg)	Estimated Practical Quantitation Limit / Reporting Limit (mg/kg)
Diesel Range Hydrocarbons	1.60	10.0
Lube Oil Range Hydrocarbons	3.19	25.0

7.2.2 Practical Quantitation Limits

Practical quantitation limits are the lowest concentrations that can be reliably measured within specified limits of precision, accuracy, representativeness, completeness, and comparability during routine laboratory operation conditions (WAC 173-340-200). At Test America, practical quantitation limits are equivalent to reporting limits. The NWTPH-Dx method detection limits are below the cleanup and remediation levels for this site, but the reporting limits do vary during routine analyses. When the lab cannot meet the cleanup levels or remediation levels with the reporting limits, appropriate analytical QA/QC will be provided to Ecology to justify use of that reporting limit. The reporting limit may typically be 10.0 mg/kg for diesel range hydrocarbons and 25.0 mg/kg for lube oil range hydrocarbons, i.e., 35 mg/kg NWTPH-Dx, but needs to be approved by Ecology upon review of the QA/QC information.

7.2.3 Precision

Precision will be determined for field split samples by examining sample results for degree of variance.

Precision is a measure of agreement among individual measurements of the same parameter, usually under prescribed similar conditions. Precision is best expressed in terms of the relative percent difference. The relative percent difference (RPD) parameter will be calculated to define the precision between duplicate analyses.

The RPD for each component is calculated using the following equation:

$$\% \text{ RPD} = \frac{(X_2 - X_1)}{[(X_1 + X_2)/2]} \times 100$$

where:

X_1 = parent sample value

X_2 = duplicate sample value

The laboratory objective for precision is to generate RPD values that fall within the established control limits for the method employed. The field objective for precision is to generate RPD values that are between 0 and 50 percent for soil and sediment samples (USEPA, 1996). If the criteria are not met, the data reviewer will examine other quality-control criteria to determine the need for some qualification of the data.

7.2.4 Accuracy

Accuracy is defined as the degree of agreement between a measurement and an accepted reference of true concentration and is an indication of any bias that exists during sampling, handling, matrix interference, and analysis. Accuracy is determined by spiking samples with a known concentration of standard compounds and comparing the analytical results with the known value. Data accuracy will be assessed by determining the percent recovery of a spiked compound. Percent recovery (%R) is determined by the equation:

$$\%\,R = \frac{(C_1 - C_0)}{C_S} \times 100$$

where:

C_1 = measured concentration in the spiked sample

C_0 = measured concentration in the unspiked sample

C_s = concentration at which the sample was spiked

The concentration at which the sample was spiked (C_s) is calculated, using the following equation:

$$C_S = \frac{(C_{spike} \times V_{spike})}{V_{sample} + V_{spike}}$$

where:

C_s = concentration at which the sample was spiked

C_{spike} = spike concentration

V_{spike} = volume of spike

V_{sample} = volume of sample

The laboratory objective for accuracy is to generate $\%R_s$ that fall within established control limits for the method employed. These control limits are the more conservative of laboratory control charts that consider 9-12 months of laboratory quality control data and method specifications.

Surrogate and matrix spiking compounds and sample selection for spiking are determined by current SW-846 methodologies. Percent recoveries indicate the actual performance of the analytical method on real world samples. Surrogate spikes, matrix spikes, matrix spike duplicates, and QC spikes will be conducted using standard laboratory methods.

7.2.5 Representativeness

Representativeness is the degree to which data accurately and precisely represent a characteristic population, a process control or an environmental condition. Taking the following steps will ensure representativeness of the data:

- Performing sampling procedures as described in this SAP and recording any deviations from these methods in the project field book
- Using only standard USEPA analytical procedures with well established quality assurance/quality control criteria
- Using a contract lab with a well established performance record
- Subjecting all data to validation process.

Appropriate sampling procedures will be implemented so that the samples are representative of the environmental matrices from which they were obtained as specified above.

7.2.6 Comparability and Completeness

Comparability is achieved through the use of the same analytical methods that were used previously, through use of trained personnel and through following procedures in this SAP. Extraction or analytical procedures performed by the laboratory for the project will be in compliance with USEPA standard methods and references for these methods will be included with the analytical report. Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. The completeness goal will be at least 90 percent.

7.3 Data Management and Assessment

The data collected and validated as part of the project scope of work will be combined with the data already compiled for the facility. This section discusses the management of data generated as part of the field effort.

7.3.1 Data Management

Reporting

After receipt of the analytical results, the QA Officer will review all raw data, including QA/QC data from the sample analyses.

Periodic reports will include a summary of data reduction results and a discussion of any inconsistencies that exist from a data-use standpoint. All field data sheets will be included as an appendix in the reports. All raw data

will be appropriately identified in reports and included in a separate appendix of the report. Raw data will be submitted to Ecology following the schedule and format specified in the Agreed Order for this project.

Representativeness

The determination of the representativeness of the data will be performed by:

- Comparing actual sampling procedures to those delineated in this plan.
- Examining the results of QC samples for evidence of cross-contamination; such evidence may be cause for invalidations or qualification of the affected samples.
- Invalidating non-representative data or identifying data to be classified as questionable or qualitative. Only representative data will be used in subsequent data reduction, validation activities and facility characterization.

The analytical results of the equipment rinseate samples (cross-contamination) will be compared to the results of the field samples to determine if the level of impact is significant. The rule of 5x will be used when chemicals are measured in a QC sample. This rule states that if a sample concentration is less than five times (5x) the QC sample, the sample should be qualified as non-detectable (EPA, 1988).

Data Review

The objective of the data review is to identify any qualitative, unreliable or invalid laboratory measurements. Data review entails a review of the laboratory-provided QC data to verify that the laboratory is properly performing the QC program and is operating within the required control limits. As a result, it will be possible to determine which samples, if any, are related to out-of-control laboratory QC samples. Laboratory data will be screened for inclusion of and frequency of the necessary QC supporting information, such as detection limit verification, duplicates, spikes and method blanks. QC supporting information will be screened to determine whether any data are outside established control limits. Any out-of-control data without appropriate corrective action will be cause to qualify the affected measurement data. Missing or infrequent QC information will be cause to contact the laboratory concerning affected measurement data and to request additional QC supporting information for re-analysis.

7.3.2 Data Assessment

Data assessment will be conducted in accordance with RETEC Standard Operating Procedure 410 (Attachment A).

Laboratory Procedures

Following the assessment of laboratory data for the inclusion of required QC data, the QC data will be analyzed for accuracy and precision. If quality control audits result in the detection of unacceptable data, the QA Officer will be responsible for initiating corrective action, which may include:

- Reanalyzing samples if holding-time criteria permit
- Resampling and analyzing
- Evaluating and amending sampling and analytical procedures
- Accepting data and acknowledging the level of uncertainty.

Accuracy

The accuracy of the data will be determined as follows:

- Computing percent recoveries for spiked samples
- Calculating the standard deviation in the overall average recovery value
- Determining the range of uncertainty at a given level of confidence.

The accuracy of the data will be used to determine any bias in the analytical methods. The field sample results will not be adjusted for bias, but the bias will be considered in the interpretation of the data.

Precision

The determination of the precision of the data will be performed by examining duplicate samples for degree of variance and by determining if sampling error has occurred by the variance of duplicates. The precision values calculated from the field duplicates will be used in the data interpretations to determine how sensitive the site characterizations are to the variances in the data.

Specific precision targets cannot be formulated without baseline precision data. However, the precision data will be summarized into the following categories. For each compound or element, the number of field duplicates with variance in the following ranges will be evaluated:

- Less than 10 percent
- 10 to 25 percent
- 25 to 50 percent
- Greater than 50 percent.

This will provide qualitative information to the individuals interpreting the data as to the range of variances and will also allow the proper planning for QC samples in future sampling episodes..

7.3.3 Data Validation

After reviewing the laboratory analytical data, the QA officer will provide the Data Validator with the data and field notes from the applicable sampling activities. The Data Validator will compare the actual sampling and laboratory procedures to those explained in this plan, identify any questionable or qualitative data, and report the validation results to the QA Officer.

8 Review and Reporting of Laboratory Data

Data quality and utility depends on many factors, including sampling methods, sample preparation, analytical methods, quality control and documentation. Physical and chemical data have been divided into five categories (EPA Region V Model Quality Assurance Project Plan, 1991), as follows:

- **Level V B Nonstandard Methods.** Analyses by nonstandard protocols, such as ultra-low detection limits or analysis of an unusual chemical compound. These analyses often require method modification and/or development. CLP (Contract Laboratory Program) Special Analytical Services (SAS) projects are considered Level V.

- **Level IV B CLP Routine Analytical Services (RAS).** This level is characterized by rigorous QA/QC protocols and documentation, and it provides qualitative and quantitative analytical data. Some EPA regions have obtained similar support via their own regional laboratories, university laboratories or other commercial laboratories.

- **Level III B Laboratory Analysis (using methods other than the CLP RAS).** This level is used primarily in support of engineering studies, using standard EPA-approved procedures. Some procedures may be equivalent to CLP RAS, without the CLP document requirements.

- **Level II B Field Analysis.** This level is characterized by the use of portable analytical instruments that can be used on-site or in mobile laboratories stationed near a site (close-support labs). Depending upon the types of impacts, sample matrix and personnel skills, qualitative and quantitative data can be obtained.

- **Level I B Field Screening.** This level is characterized by the use of portable instruments that can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. The types of data included are those generated on site through the use of PID, pH, conductivity, or other real-time monitoring equipment. Data can be generated regarding the presence or absence of certain materials (especially volatiles) at sampling locations.

The data generated in this project will be prepared and reviewed for Level III validation. The laboratory will use EPA methods to identify analytical values that do not meet the required ranges for surrogate recoveries and matrix spike

recoveries. If such values are identified, then the analysis must be repeated. If the re-analyzed values are within required limits and holding times, they will be reported as true values. If, in the repeated analysis, the values are still outside required limits, the data are considered to be invalid, and matrix effects are considered to have caused the values to be outside of the acceptable recovery limits.

8.1 Analytical Data

The laboratory will submit results that are supported by sufficient backup data and QA/QC results to enable the quality of the data to be determined conclusively. Prior to release of data, the laboratory coordinator(s) will: review the data package for reasonableness; review QC data results; verify that calculation checks were properly performed; review chain-of-custody record(s), sample preservation, and holding-time requirements; and write a project narrative. Data that are not acceptable will be held until the problems are resolved. Section 3 of this SAP describes the procedures that are employed to evaluate the precision, accuracy, representativeness, and completeness of the analytical test data generated during this project. It is the responsibility of the QA Officer to review these parameters. Validity of all data will be determined based on the criteria described in Section 3.

8.2 Final Reporting and Archiving of Laboratory Documents

Upon successful completion of the data validation process, all data generated at the site will be tabulated and stored on computer disk in a format suitable for import to a relational database. Data summaries and results will be submitted in final report form as a completion report. This report will consist of all pertinent sample and project information. It will also identify analytical procedures.

Copies of all analytical data and/or final reports will be retained in the laboratory files, and at the discretion of the Laboratory Coordinator(s), the data will be stored on computer disks for a minimum of 1 year.

After one year, or whenever the data become inactive, the files will be transferred to archives in accordance with standard laboratory procedure. Data may be retrieved from archives upon request.

9 References

Ecology, 1991. *Guidance and Specifications for Preparing Quality Assurance Project Plans.* Washington State Department of Ecology.

Ecology, 1995a, *Guidance for Remediation of Petroleum Contaminated Soils*. Washington State Department of Ecology Toxics Cleanup Program. Document 91-30.

Ecology, 1995. *Guidance on Sampling and Data Analysis Methods*. Washington State Department of Ecology Toxics Cleanup Program.

Ecology, 1997. *Analytical Methods for Petroleum Hydrocarbons*. June. Publication 97-602.

EPA, 1988. *Laboratory Data Validation Functional Guidelines for Evaluating Organic Analyses.* U.S. Environmental Protection Agency, Region I.

EPA, 1991. *EPA Region V Model Quality Assurance Project Plan.* U.S. Environmental Protection Agency, Region V, Office of Superfund.

EPA, 1994. *Test Methods for Evaluating Solid Waste – Physical/Chemical Methods.* Third Edition. U.S. Environmental Protection Agency. SW-846.

RETEC, 2005. *Final Feasibility Study- Skykomish, Washington*. Prepared for BNSF Railway Company. Seattle, March.

USEPA Region I, 1996. Laboratory Data Validation Functional Guidelines for Evaluating Organics Analyses, December.

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Attachment A

RETEC Standard Operating Procedures (SOPs)

RETEC Standard Operating Procedure (SOP) 120 Decontamination

1.0 Purpose and Applicability

The RETEC Group, Inc. (RETEC) SOP 120 describes the methods to be used for the decontamination of items that may become contaminated during field operations. Decontamination is performed as a quality assurance measure, and as a safety and health precaution. It prevents cross-contamination between samples and also helps maintain a clean working environment. Equipment requiring decontamination may include hand tools, monitoring and testing equipment, personal protective equipment (PPE), or heavy equipment (e.g., loaders, backhoes, drill rigs, etc.).

Decontamination is achieved mainly by rinsing with liquids, which may include soap and/or detergent solutions, tap water, distilled water, and methanol or isopropyl alcohol. Equipment may be allowed to air dry after being cleaned or may be wiped dry with paper towels or chemical-free cloths.

All sampling equipment will be decontaminated prior to use and between each sample collection point. Waste products produced by the decontamination procedures, such as rinse liquids, solids, rags, gloves, etc., will be collected and disposed of properly, based on the nature of contamination and site protocols. Any materials and equipment that will be reused must be decontaminated or properly protected before being taken off site.

Specific project requirements as described in an approved Work Plan, Sampling Plan, Quality Assurance Project Plan, the RETEC Corporate Environment, Health, and Safety (EHS) Manual, Job Hazard Analysis (JHA), Safety Task Analysis Review (STAR), or Site-Specific Health and Safety Plan (HASP) will take precedence over the procedures described in this document.

2.0 Responsibilities

It is the responsibility of the field sampling coordinator to ensure that proper decontamination procedures are followed and that all waste materials produced by decontamination are properly managed. It is the responsibility of any subcontractors (e.g., drilling or sampling contractors) to follow the designated decontamination procedures that are stated in their contracts and outlined in the project HASP. It is the responsibility of all personnel involved with sample collection or decontamination to maintain a clean working environment and to ensure that no contaminants are inadvertently introduced into the environment, tracked out of the contamination reduction zone (CRZ), or passed from one sample point to another.

3.0 Health and Safety

This section presents the generic hazards associated with decontamination and is intended to provide general guidance in preparing site-specific health and safety documents. The Site-Specific HASP, JHAs, and STARs will address additional requirements and will take precedence over this document. Note that decontamination usually requires Level D personal protection unless there is a potential for airborne exposures to site contaminants. Under circumstances where potential airborne exposure is possible respiratory protective equipment may be required based on personal air monitoring results. Upgrades to Level C will be coordinated with your Site Safety and Health Officer (SSHO) or EHS Coordinator.

Health and safety hazards potentially involved decontamination include the following:

- Skin contact with decontamination solvents. Wear solvent impervious gloves when decontaminating equipment. Methanol and isopropanol are approved but use the solvents sparingly and dispense only from pre-labeled polypropylene solvent wash bottles. Whenever possible use an aqueous based non-toxic cleaning agents in lieu of solvents. **Hexane is prohibited from use for decontamination.**

- Avoid contact with site contaminants. Exposure to contaminated media is possible when either removing contaminated personal protective equipment (PPE) or decontaminating heavy equipment. Take care to prevent slips and falls when scrubbing over boots in the CRZ and remove PPE using proper "inside-out" techniques to minimize airborne exposure to potentially contaminated particulate. In addition to Level D PPE, wear a face shield when brushing off heavy equipment or using a pressure washer. Consult the Corporate EHS Manual for additional precautions.

- Decontamination pad liquids. If large volumes of rinsates are generated, wash water must be properly characterized prior to disposal. Avoid contact and wear PPE during liquids transfer.

4.0 Supporting Materials

The following materials should be on hand in sufficient quantity to ensure that proper decontamination methods and procedures are followed:

- Cleaning liquids and dispensers (phosphate-free soap and/or detergent solutions, tap water, distilled water, deionized water, reagent grade methanol or isopropyl, etc.)

- PPE, as defined in the project HASP

- Paper towels or chemical-free cloths

- Disposable chemically impervious gloves
- Waste-storage containers (e.g., drums, boxes, plastic bags)
- Drum labels, if necessary
- Cleaning containers (e.g., plastic and/or galvanized steel pans or buckets)
- Cleaning brushes
- Plastic sheeting
- Material Safety Data Sheets (MSDSs) for any chemicals or site-specific contaminants and decontamination solvents
- A copy of the Site-Specific HASP (consult for heavy equipment decontamination)

5.0 Methods and Procedures

The extent of known contamination will determine the degree of decontamination required. When the extent of contamination cannot be readily determined, cleaning should be done according to the assumption that the equipment is highly contaminated.

Standard operating procedures listed below describe the method for full field decontamination. If different technical procedures are required for a specific project, they will be spelled out in the project plans.

Such variations in decontamination may include all or an expanded scope of these decontamination procedures:

- Remove gross contamination from the equipment by brushing and then rinse with tap water.
- Wash with detergent or soap solution (e.g., Alconox and tap water).
- Rinse with tap water or distilled water.
- Rinse with reagent grade methanol or isopropyl alcohol.
- Rinse with deionized water (distilled water is an acceptable substitute if deionized water is unavailable).
- Repeat entire procedure or any parts of the procedure as necessary.

- After decontamination procedure is completed, avoid placing equipment directly on ground surface to avoid re-contamination.

Downhole drilling equipment, such as augers, split spoons, Shelby tubes, and sand lines, will be decontaminated with pressurized hot water or steam wash, followed by a fresh water rinse. No additional decontamination procedures will be required if the equipment appears to be visually clean. If contamination is visible after hot water/steam cleaning, then a detergent wash solution with brushes (if necessary) will be used. Items heavily contaminated with product may require more aggressive decontamination techniques. If the items cannot be discarded, consult your EHS coordinator to obtain guidance in this regard.

6.0 Quality Assurance/Quality Control

To assess the adequacy of decontamination procedures, rinsate blanks should be collected and analyzed for the same parameters as the field samples. Specific number of blanks will be defined in the project-specific sampling plan. In general, one rinsate blank will be collected per 20 samples.

7.0 Documentation

Field notes describing procedures used to decontaminate equipment/personnel and for collection of the rinsate blanks will be documented by on-site personnel. Field notes will be retained in the project files.

RETEC Standard Operating Procedure (SOP) 210 Soil Sample Collection

1.0 Purpose and Applicability

The RETEC Group, Inc. (RETEC) SOP 210 describes methods used to obtain soil samples for physical testing, stratigraphic correlations, and chemical analysis. Soil samples are obtained in conjunction with surface sampling, test pit excavation, soil boring, and monitoring well installation programs. These procedures provide specific information for determining the physical makeup of the surface and subsurface environment, as well as how to estimate the extent and magnitude of soil contamination, if present. RETEC SOP 210 will discuss sampling of the surface material with hand tools and sampling of the subsurface material by augers and split spoons, and within test pits by backhoes and hand tools.

Specific project requirements as described in an approved Work Plan, Sampling Plan, Quality Assurance Project Plan, Job Hazard Analysis, Safety Task Analysis Review, or Site-Specific Health & Safety Plan will take precedence over the procedures described in this document.

2.0 Responsibilities

The project geologist/engineer will be responsible for the proper use and maintenance of all types of equipment used for obtaining soil samples. The geologist/engineer will determine the location, total depth, and overall size of each surface sample collection point and test pit, and the location and depth of all subsurface borings based on the project specific sampling plan. The project geologist/engineer will be responsible for locating any subsurface utilities or structures, and disseminating this information to the contractor prior to commencing the sampling program. The location of overhead utilities and obstructions relative to the sampling locations will also be noted. In addition, a Safety Task Analysis Review will be conducted to assess any other potential health and safety hazards associated with soil sample collection.

It shall be the responsibility of the project geologist/engineer to observe all activities pertaining to soil sampling and subsurface investigations to ensure that all the standard procedures are followed properly, and to record all pertinent data on a field log or field book. The collection, handling, and storage of all samples will be the responsibility of the geologist/engineer.

It is the responsibility of the contractor to provide safe and well-maintained equipment for obtaining subsurface samples in borings and for decontamination of the equipment. Test pit construction, split-spoon sampling, and subsurface augering will be conducted by the

contractor. In addition, the contractor will be responsible for containment of cuttings, if required.

3.0 Health and Safety

This section presents the generic hazards associated with soil sampling techniques and is intended to provide general guidance in preparing site-specific health and safety documents. The Site-Specific Health & Safety Plan, Job Hazard Analyses, and Safety Task Analysis Reviews will address additional requirements and will take precedence over this document. Note that sample collection usually requires Level D personal protection unless there is a potential for airborne exposures to site contaminants.

Health and safety hazards include but are not limited to the following:

Test Pit Excavation

- Heavy equipment operation
- Cave-in (trench/excavation work)
- Hazardous materials (exposure and/or release)
- Utilities (underground)
- High noise levels
- Air quality (i.e., chemical, dust, explosive conditions)
- Uneven walking/working surfaces

Hollow Stem Auger Drilling

- Heavy equipment operation
- Pinch points
- Rotating parts
- Loose clothing
- Heavy lifting
- Air quality (i.e., chemical, dust, explosive conditions)
- Hazardous materials (exposure and release)
- Pressurized lines
- High noise levels
- Utilities (underground or overhead)
- Hoisting
- Overhead hazards
- Hand hazards

Rotary Drilling (Mud/Air)

- Same as above
- Increased noise hazard
- Increased dust hazard (air rotary)

- Cyclones/Diverters (pressurized lines should be anchored with whip-stops)
- Investigation derived waste containment
- Blow protect inspection/replacement
- Sample collection (i.e., there are increased hazards when taking samples from air rotary rigs resulting from overhead hazards (cyclones), pressurized lines, increased noise, and air quality at sample collection outlets. Field personnel must be aware of these hazards and initiate engineered controls to limit these hazards.)

If site/project conditions warrant the use of other drilling techniques, hazards associated with these techniques will be evaluated by amendment in the site-specific Health & Safety Plan, Job Hazard Analyses, or Safety Task Analysis Reviews. Drill rig inspections, if applicable, will be completed prior to initiating soil sampling.

4.0 Supporting Materials

In addition to materials provided by the contractor, the geologist/engineer will provide:

- Sample bottles/containers and labels
- Boring or test pit logs
- Field notebook
- Chain-of-custody forms
- Depth-measurement device
- Stakes and fluorescent flagging tape
- Decontamination solution
- Camera for photographing sections
- Sampling equipment (e.g., knives, trowels, shovels, hand augers, aluminum foil, etc.)
- Plastic garbage bags
- Material Safety Data Sheets (MSDSs) for any chemicals or site specific contaminants
- A copy of the site-specific Health and Safety Plan

5.0 Methods and Procedures

Specific sampling equipment and methodology will be dictated by characteristics of the soil to be sampled, type of soil samples required, and by the analytical procedures to be employed. Soil samples obtained at the surface may be collected using a shovel, trowel, or hand auger. A hand auger can be used to extract shallow soil samples up to 10 feet below the surface. Sampling to obtain uniform coverage within a specified area will often require the use of an area grid. These considerations will be followed based upon project specific requirements.

There are two types of samples that may be required by the project sampling plan, grab or composite. A grab sample is collected from a specific location or depth and placing it in the appropriate sample container. A composite sample consists of several discrete locations (or depths) mixed to provide a homogeneous, representative sample. To ensure that the sample is representative, the soil volume and collection method from each discrete location should be as identical as possible. It should be noted that samples analyzed for volatile organic compounds cannot be composited since it is necessary to expose the soil to the atmosphere prior to transfer into the sample container.

The sampling depth interval in borings is typically one sample for every five feet with additional samples taken at the discretion of the project geologist/engineer when significant color, textural, or odor changes are encountered. Deviations in the standard operating procedure will be covered in the project specific sampling plans.

Most subsurface explorations by RETEC will be on privately owned land, often an industrial facility. Prior to commencing subsurface exploration, RETEC will work with the facility manager to locate any subsurface utilities or structures and discuss any pertinent health and safety issues. Utility companies, (electric, gas, water, phone, sewer, etc.) who may have equipment or transmission lines buried in the vicinity, will also be notified. Many regions have organizations, which represent all utilities for these notification purposes. Allow enough time after notification (typically three working days) for the utilities to respond and provide locations of any equipment, which may be buried on site. Overhead lines must also be kept in consideration when a drilling rig is used. As a rule of thumb, the rig and derrick should be at least 25 feet away from overhead lines unless special shielding and grounding are provided. In addition, consult the site-specific health and safety documentation.

5.1 General Applications

General locations shall be mapped by the field geologist/engineer using a stationary structure as the reference point. Specific locations for test pits and sampling locations will be documented by survey or by using topographic maps and/or plans. A preliminary log of the test pit, or boring shall be prepared in the field by the field geologist/engineer. A sketch of the test pit may be necessary to depict the strata encountered. Before measuring the depth to groundwater, if encountered, the field geologist/engineer will allow sufficient time for stabilization of the water table in the excavation or boring. All information shall be recorded on the field log or the field book.

5.2 Surface Sampling

Prior to surface sampling, remove all surface materials that are not to be included in the sample such as rocks, twigs, and leaves. For sample collection taken within the upper two to three feet, use a shovel or trowel. A hand auger may be used for depths of up to 10 feet. When using the hand auger, auger the hole to the required depth, then slowly remove the auger and collect the soil sample from the auger flight or auger bucket at the point corresponding to the required depth. A tube sampler can be attached to the auger rods after augering to the desired depth, inserted into the open borehole, and then advanced into the soil at the base of the boring. If sampling is in sandy or non-cohesive soil, a shovel may be necessary to collect samples. Sample logging is described in Section 5.5.

Photographs of specific geologic features or sample location may be required for documentation purposes. A scale or item providing a size perspective should be placed in each photograph. The frame number and picture location shall also be documented in the field book. All equipment shall be decontaminated following RETEC SOP 120 between sample locations unless otherwise specified in the project specific sampling plan.

5.3 Test Pit Excavation and Sampling

Test pits shall be excavated in compliance with applicable safety regulations. Walls should be cut as near vertical as possible to facilitate stratigraphic logging. Field personnel will not enter an open test pit deeper than four feet without shoring or benching present. Samples shall be collected from the backhoe bucket with a trowel or from the side of the test pit wall (depending upon the depth of the test pit and the safety precautions in place). The size, depth, and orientation of the test pit shall be recorded on the test pit log (Figure 1). Sample logging is described in Section 5.5.

Photographs of specific geologic features or sample location may be required for documentation purposes. A scale or item providing a size perspective should be placed in each photograph. Frame numbers and picture locations shall also be documented in the field book.

The test pit shall be inspected and the test pit log reviewed to ensure that all the appropriate and/or required data and samples have been collected. All test pits will be backfilled to original grade and compacted. All equipment shall be decontaminated following RETEC SOP 120 and guidance provided in the Health and Safety Plan between sample locations unless otherwise specified in the project specific sampling plan. Avoid using flammable liquids for decontamination purposes.

5.4 Subsurface Sampling

Note: RETEC employees conducting these operations must have completed a drilling safety course.

Borings are typically advanced by two methods: rotary drilling and augering. The casing shall be of the flush-joint or flush-couple type and of sufficient size to allow for soil

sampling, coring, and/or well installation. All casing sections shall be straight and free of any obstructions. Hollow-stem augers or solid-flight augers with casing may be used according to specific project requirements. Rotary drilling with water, mud, or air may be used in dense or indurated formations to advance to the required sample depth where a split spoon sampler or a coring device will be used to obtain the sample. Re-circulated water shall not be used when casing is being driven unless specified in project specific sampling plans and/or directed and properly documented by the field geologist/engineer. If re-circulated water is used, all loose material within the casing shall be removed by washing to the required sampling depth using a minimum amount of water. Care should be taken to limit re-circulation of the wash water to those times when the water supply is extremely limited or unavailable. The amount of water used should be documented in the project field book or on the field form.

Generally subsurface soil samples shall be obtained using a split-tube type sampler (split spoon), however, other devices (Shelby tubes, continuous samples, core, etc.) may be used as specified in the project specific sampling plan. Split-spoons come in a variety of sizes with the most standard having a 2-inch OD, a 1 3/8-inch ID and a 24-inch long barrel with an 18-inch sample capacity. Split spoons shall be equipped with a check valve at the top and a flap valve or basket-type retainer at the bottom. Samples shall be obtained using the standard penetration test (SPT), which allows for qualitative determination of mechanical properties and aids in identification of material type. The number of hammer blows shall be recorded on the boring log (Figure 2) for each six-inch drive distance.

The soil sampler shall be opened immediately upon removal from the casing. If the recovery is inadequate (i.e., most of the penetrated material was not retained inside the soil sampler), a note will be made on the boring log stating that "no recovery" was possible at that depth. In the event that gravels or other material prevent penetration by the split spoon, samples may be collected from the auger flights. Slowly remove the auger and collect the sample at the point corresponding to the required depth. Samples collected in this manner must be documented on the boring log. Sample logging is described in Section 5.5.

Photographs of specific geologic features or sample location may be required for documentation purposes. A scale or item providing a size perspective should be placed in each photograph. The frame number and picture location shall also be documented in the field book. All equipment will be decontaminated following RETEC SOP 120 between sample locations and sample depths unless otherwise specified in the project specific sampling plan.

Upon completion of the boring, backfill may be required. The backfill may consist of native material, hydrated bentonite chips/pellets, Portland cement/bentonite grout, or other low permeability material as specified in the project specific sampling plan. All applicable state/federal regulations concerning plugging of boreholes should be reviewed prior to the commencement of field activities.

5.5 Sample Logging

To ensure consistent descriptions of soil or rock material, the following criteria should be included on the sampling logs:

- Soil or rock type
- Depth ranges, recorded in feet
- Grain size
- Roundness
- Sorting
- Moisture
- Color
- Degree of oil contamination
- Remarks

Examples of soil types would be gravel, sand, silt, or clay. Soil types should be based on the Unified Soil Classification System (USCS). Figure 3 shows the USCS table. Examples of rock types include limestone, shale, claystone, siltstone, and sandstone. Soil/rock classifications determined in the field may be subject to change based upon laboratory tests. Factors to consider before changing a field determination include the expertise of the field geologist/engineer and laboratory personnel, representative character of the tested sampling, labeling errors, etc. Any changes made after this consideration shall be discussed and incorporated in the project report.

Grain size, roundness, and degree of sorting should also be included on the log if they are discernable. In addition to composition, blow counts and the length of the sample recovered should also be recorded on the sampling log. The degree of sample moisture should be described as dry, moist, and wet.

The color(s) or range of color(s) of the soil or rock type should be defined. If a Munsell color chart is used, the number designation of the color will also be recorded in the description. A notation of the degree of oil contamination should be included on the sample log. The contamination should be noted as high (30 %), medium (10-30 %), low (1-10 %), or none. Other classifiers may include odor (low to high) and mottling (low to high).

Remarks should include anything pertinent to the sample description or sample collection that is not described above. Other information to be placed on the logs as appropriate is:

- PID readings (with associated calibration information)
- Appearance of contamination (consistency)
- Degree of fracturing or cementation in the rock
- Drilling equipment used (rod size, bit type, pump type, rig manufacturer and model, etc.)

- Special problems and their resolution (hole caving, recurring problems at a particular depth, sudden tool drops, excessive grout takes, drilling fluid losses, lost casing, etc.)

Dates for start and completion of borings

- Depth of first encountered free water
- Definitions of special abbreviations used on log

5.6 Sample Handling

Specific procedures pertaining to the handling and shipment of samples shall be in accordance with RETEC SOP 110. A clean pair of gloves and decontaminated sampling tools will be used when handling the samples during collection to prevent cross contamination. A representative sample will be placed in the sampling container. Sample containers (jars or bags) shall be labeled with the following information:

- Client or project name, or unique identifier, if confidential
- Unique sample description (i.e., test pit, boring, or sampling point number and horizontal/vertical location)
- Sample collection date and time
- Sampler's name or initials
- Analyses to be performed

These data shall be recorded on the field logs and/or field book. Larger bulk samples shall be placed in cloth bags with plastic liners or plastic five-gallon buckets. Sample bags shall be marked with the information listed above.

6.0 Quality Assurance/Quality Control

Quality Assurance/Quality Control (QA/QC) requirements include, but are not limited to, blind field duplicates, blind rinsate blanks, and blind field blanks. These samples will be collected on a frequency of one QA/QC sample per 20 field samples or a minimum of one QA/QC sample per day unless otherwise specified in the project specific sampling plan.

7.0 Documentation

Documentation may consist of all or part of the following:

- Test pit or boring log
- Sample log sheets

- Field log book
- Chain-of-custody forms
- Shipping receipts
- Health & Safety forms (Job Hazard Analysis, Safety Task Analysis Review, and/or Site Specific Health & Safety Plan amendments)
- PID calibration records

All documentation shall be placed in the project files and retained following completion of the project.

8.0 References

Handbook of Suggested Practices for the Design and Installation of Ground-Water Monitoring Wells, EPA/600/4-89/034, published by National Water Well Association, 1991.

RCRA Ground Water Monitoring Technical Enforcement Guidance Document, published by National Water Well Association, 1986.

A Compendium of Superfund Field Operations, EPA 540/P-87/001, published by the Office of Emergency and Remedial Response, Office of Waste Programs Enforcement, US EPA, 1987.

Preparation of Soil Sampling Protocols: Sampling Techniques and Strategies, EPA/600/R-92/128, published by the Environmental Research Center, 1992.

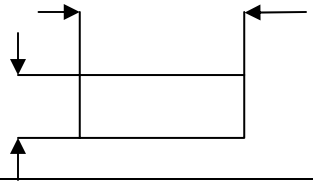
The RETEC Group
Test Pit Log

TEST PIT: TP-
SHEET:

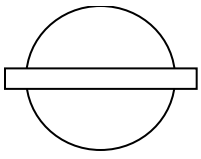
PROJECT:	LOCATION:	CONTRACTOR:
PROJECT NO.:	EQUIPMENT USED:	
DATE:	TOTAL DEPTH (ft.):	
START TIME: / FINISH TIME:	LOGGED BY:	

Depth Range	Sample Type and Number	USCS	Depth (ft.)	Soil and Rock Description and Comments
			1	
			2	
			3	
			4	
			5	
			6	
			7	
			8	
			9	

TEST PIT PLAN



NORTH



Groundwater		
Date	Time (hours after completion)	Depth (ft.)

Comments:

The RETEC Group	**BORING LOG**	BORING SHEET OF
PROJECT	CONTRACTOR	MONUMENT
PROJECT #	DRILLER	RISER
LOCATION	RIG TYPE	SCREEN
TOTAL DEPTH	METHOD	FILTER PACK
DATE	CASING ID	SEAL
START / FINISH	BORING ID	GROUT
LOGGED BY DMS	BIT TYPE	GROUND ELEV.

SAMPLE TYPE AND NUMBER	BLOWS PER 6 INCH	DEPTH RANGE	% REC	DEPTH FEET	SAMPLE DESCRIPTION CLASSIFICATION SCHEME_____

GROUNDWATER DEPTH (FT)	DATE/TIME
REMARKS	

FIELD GUIDE AND USCS CLASSIFICATION TABLE

SAND

SOIL TYPE	SPT, N Blows/ft.	Relative Density, %	FIELD TEST
VERY LOOSE SAND	4	0 – 15	Easily penetrated with ½ " reinforcing rod pushed by hand.
LOOSE SAND	4 – 10	15 – 35	Easily penetrated with ½ " reinforcing rod pushed by hand.
MEDIUM DENSE SAND	10 – 30	35 – 65	Penetrated a foot with ½ " reinforcing rod driven with 5-lb hammer.
DENSE SAND	30 – 50	65 – 85	Penetrated a foot with ½ " reinforcing rod driven with 5-lb hammer.
VERY DENSE SAND	50	85 – 100	Penetrated only a few inches with ½ " reinforcing rod driven with 5-lb hammer.

CLAY

CLAY CONSISTENCY	THUMB PENETRATION	SPT, N BLOWS/ FT.	Undrained Shear Strength c (PSF)	Unconfined Compressive Strength (PSF)
			TORVANE	Pocket Penetrometer
VERY SOFT	Easily penetrated several inches by thumb. Exudes between thumb and fingers when squeezed in hand.	<2	250	500
SOFT	Easily penetrated one inch by thumb. Molded by light finger pressure.	2 – 4	250 – 500	500 – 1000
MEDIUM STIFF	Can be penetrated over ¼ " by thumb with moderate effort. Molded by strong finger pressure.	4 – 8	500 – 1000	1000 – 2000
STIFF	Indented about ¼ " by thumb but penetrated only with great effort.	8 – 15	1000 – 2000	2000 – 4000
VERY STIFF	Readily indented by thumbnail.	15 – 30	2000 – 4000	4000 – 8000
HARD	Indented with difficulty by thumbnail.	>30	>4000	>8000

Unified Soil Classification System (USCS)

		MILLIMETERS	INCHES	SIEVE SIZES
BOULDERS		> 300	> 11.8	-
COBBLES		75 – 300	2.9 – 11.8	-
GRAVEL	COARSE	75 – 19	2.9 - .75	-
	FINE	19 – 4.8	.75 - .19	¾ " – No. 4
SAND	COARSE	4.8 – 2.0	.19 - .08	No. 4 – No. 10
	MEDIUM	2.0 - .43	.08 - .02	No. 10 – No. 40
	FINE	.43 - .08	.08 - .003	No. 40 – No. 200
FINES	SILTS	< .08	< .003	< No. 200
	CLAYS	< .08	< .003	< No. 200

Table Title

MAJOR DIVISIONS			LETTER SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	GRAVEL AND GRAVELLY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN GRAVELS (LITTLE OR NO FINES)	GW	WELL – GRADED GRAVELS, GRAVEL – SAND MIXTURES, LITTLE OR NO FINES.
			GP	POORLY – GRADED GRAVELS, GRAVEL – SAND MIXTURES, LITTLE OR NOT FINES.
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL-SAND – SILT MIXTURES.
			GC	CLAYEY GRAVELS, GRAVEL – SAND – CLAY MIXTURES.
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	CLEAN SAND (LITTLE OR NO FINES)	SW	WELL – GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
			SP	POORLY – GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES.
		SANDS WITH FINES APPRECIABLE AMOUNT OF FINES)	SM	SILTY – SANDS, SAND – SILT MIXTURES
			SC	CLAYEY SANDS, SAND – CLAY MIXTURES.
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY.
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY, CLAYS, LEAN CLAYS.
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY.
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SITLS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS.
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS.
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS.
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS.

RETEC Standard Operating Procedure (SOP) 430 Hazardous Waste Management & Shipping

1.0 Purpose and Applicability

The RETEC Group, Inc. (RETEC) SOP 430 details the proper management and shipping of hazardous wastes. Specific project requirements as described in an approved Work Plan, Sampling Plan, Quality Assurance Project Plan, Job Hazard Analysis (JHA), Safety Task Analysis (STAR), or Site-Specific Health and Safety Plan (HASP) will take precedence over the procedures described in this document.

The Resource Conservation and Recovery Act (RCRA) regulates hazardous waste from the point of its generation through its point of final disposal. EPA has developed generator standards that address on-site accumulation of hazardous waste in 40 CFR 262. Additional waste accumulation and handling procedures may be required by your local state agency.

2.0 Responsibilities

Hazardous waste management is an essential component of many RETEC projects. Everyone who handles hazardous waste is responsible for ensuring that the waste is properly managed. Improperly managing waste can result in violations and fines, and criminal penalties.

3.0 Health and Safety

Although there are no specific health and safety hazards associated with this task, always remember to work safe.

4.0 Supporting Materials

Supporting materials for the management of hazardous waste are as follows:

- Copy of RCRA regulations (40 CFR 261 and 262)
- Copy of applicable state regulations
- Waste management labels

5.0 Methods and Procedures

The RCRA regulations establish a comprehensive hazardous waste management system under the authority of RCRA Subtitle C. RCRA regulates hazardous waste from the point of its generation through its point of final disposal. Hazardous waste generators are subject to varying degrees of regulation depending on the amount of hazardous waste produced. These methods and procedures define the three classifications of generators, details the varying

degree of regulation that applies to each, and explains hazardous waste manifesting and shipping requirements.

5.1 Generator Status

A generator can be thought of as any entity whose process produces hazardous waste or whose action causes a hazardous waste to be subject to regulation (40 CFR 260.10). On RETEC jobsites, our clients are almost always considered the generator. If a hazardous waste was generated in one of our offices, however, we would likely be considered the generator.

Generators fall into one of three types of generator status categories according to the amount of waste generated in a calendar month. These three classes of generators are described in Table 1: conditionally exempt small quantity generators (CESQGs), small quantity generators (SQGs), and large quantity generators (LQGs). Regulatory requirements for each become increasingly stringent as the volume of waste generated grows. Section 4.2 details the regulatory requirements for each type of generator.

Generators sometimes periodically exceed or fall below their normal generation limits in a generator month. If the amount of waste generated in that calendar month exceeds the limits of their generator status, the generator is responsible for complying with additional regulatory requirements of the new status. For example, if a generator produces 300 kilograms (kg) of hazardous waste in March, the waste must be managed in accordance with the SQG regulations; if the same generator produces 1,500 kg of hazardous waste in April, the waste must be managed in accordance with the LQG regulations (50 Federal Register (FR) 10153; March 24, 1986).

Table 1 Generator Status and Applicable Regulations

Generator Status	Quantity of Waste Generated	Accumulation Limit	Applicable Regulations
Conditionally Exempt Small Quantity (CESQG)	≤ 100 kg / month ≤1 kg acute ≤ 100 kg acute residue or contaminated soil	1,000 kg	§261.5
Small Quantity (SQG)	Between 100-1,000 kg / month (approx. 220 – 2200 lbs)	6,000 kg	Part 262, Subparts A, B, C (§262.34(d) is specific to SQGs); and Subparts E, F, G, H if applicable; and portions of Subpart D as specified in §262.44
Large Quantity (LQG)	≥ 1,000 kg / month (approx. 2,200 lbs) > 1 kg / month acute (approx. 2.2 lbs) > 100 kg acute residue or contaminated soil	NA	All Part 262 Requirements

5.2 Hazardous Waste Management Requirements by Generator Status

5.2.1 Conditionally Exempt Small Quantity Generator Requirements

Hazardous waste generated by CESQG is not subject to specific management standards under the federal hazardous waste regulations. Care must be taken that a client who maintains a CESQG does not generate more than 100 kg of hazardous waste (or more than 1 kg of acute hazardous waste, or more than 100 kg of spill residue from an acute hazardous waste) on site in one month or greater than 1,000 kg total at any time. If the client exceeds the 1,000 kg limit for hazardous waste, their site is subject to the SQG requirements in §262.34(d) and discussed in Section 5.2.2 of this SOP (§261.5(g)). If a client exceeds any of the limits set for acute hazardous waste, then they are subject to Large Quantity Generator requirements discussed in Section 5.2.3 of this SOP (§261.5(f)).

If your client is a CESQG, then you must ensure that the following waste management requirements are met:

- Maintain the client's generator status by accumulating only a maximum 1,000 kg of hazardous waste, or 1 kg of acute hazardous waste, or 100 kg of acute spill residue onsite at any time (§261.5).
- Place the waste in a container that is compatible with its properties, and is in good condition (Best Management Practice (BMP))
- Label all waste with content and hazard information (OSHA HazCom)
- Inspect the waste container frequent enough to determine that the container is not leaking and is in good condition (BMP)
- Minimize potential spills by inspecting the container at regular intervals, by placing containers away from stormwater drains, and by placing waste in secondary containment, if possible (BMP).
- Ensure that personnel shipping the waste is trained in DOT hazardous materials transport, and ship the waste in accordance with DOT regulatory requirements (See Section 4.4)
- Dispose of hazardous waste at a permitted or authorized disposal facility (§261.5(f)(3) and §261.5(g)(3)).

5.2.1 Small Quantity Generator Requirements

Generally, SQGs must comply with only some of the regulations that apply to LQGs. Care must be taken that a client who maintains an SQG does not accumulate more than 6,000 kg of hazardous waste on site at any time, and that waste is shipped offsite within 180 days of generation (or 270 days if shipped 200 miles or more). If the client exceeds the 6,000 kg limit for hazardous waste or the accumulation time limit, then their site is subject to LQG or requirements detailed in Section 4.2.3 of this SOP (§261.5(f)).

If your client is an SQG, then you must ensure that the following waste management requirements are met:

- Maintain the client's generator status by generating between 100 and 1,000 kg per month and accumulating only 6,000 kg of hazardous waste onsite at any one time (§262.34).
- Read and understand your role in relation to the facility's preparedness and prevention procedures, which are required by RCRA (§262.34(d)(4)).
- Ensure that RETEC staff handling hazardous waste are trained in accordance with the facility's RCRA personnel training program (§262.34(d)(5)(iii)).
- Accumulate waste in tanks or containers only (§262.34).
- Place the waste in a container that is compatible with its properties (§260.10), is in good condition (§§264 / 265.171), and is closed, except when waste is being added or removed (§264 / 265.173).
- Ensure that hazardous waste is not mixed with any other type of waste or any materials that the waste may react with (BMP, §260.10).
- Place containers holding ignitable or reactive wastes at least 50 feet from the property line (§264 / 265.173).
- Label all waste with content and hazard information (OSHA HazCom)
- Inspect the containers for leaking and deterioration at least once a week (§§264/265.174), and retain records of inspection in a log as detailed in §§264/265.15(d).
- Minimize potential spills by inspecting the container at regular intervals , by placing containers away from stormwater drains, and by placing waste in secondary containment, if possible (BMP).
- Prepare a manifest in accordance with the instructions found in the Appendix of §262, and sign the manifest only if a legal agreement has been reached with the client (see Section 4.3).
- Ensure that personnel shipping the waste and preparing the manifest are trained in DOT hazardous materials transport, and ship the waste in accordance with DOT regulatory requirements (See Section 4.4).
- Ensure that the waste is shipped offsite at 180 days or less, or before 270 days if the waste will be shipped 200 miles or more to the disposal facility (§262.34(e)).
- Dispose of hazardous waste at a permitted or authorized disposal facility (§261.5(f)(3) and §261.5(g)(3)).

5.2.2 Large Quantity Generator Requirements

LQG are the most heavily regulated of all generators. If your client is an LQG, then you must ensure that the following waste management requirements are met:

- Read and understand your role in relation to the facility's preparedness and prevention procedures, which are required by RCRA (§262.34(d)(4)).
- Review the facility's RCRA contingency plan (§262.34(a)(4)), and understand your role should an emergency occur.
- Ensure that RETEC staff handling hazardous waste are trained in accordance with the facility's RCRA personnel training program (§262.34(d)(5)(iii)).
- Accumulate hazardous waste only in containers, tanks, containment buildings, or on drip pads (§262.34), and meet the air emission control requirements for accumulation tanks and containers (§§262.34(a)(l)(i) and (ii)).
- Place the waste in a container that is compatible with its properties (§260.10), is in good condition (§§264/265.171), and is closed, except when waste is being added or removed (§264/265.173).
- Ensure that hazardous waste is not mixed with any other type of waste (BMP) or any materials that the waste may react with (§260.10).
- Place containers holding ignitable or reactive wastes at least 50 feet from the property line (§264/265.173).
- Label all waste with content and hazard information (OSHA HazCom).
- Inspect the containers for leaking and deterioration at least once a week (§§264/265.174), and retain records of inspection in a log as detailed in §§264/265.15(d).
- Minimize potential spills by inspecting the container at regular intervals, by placing containers away from stormwater drains, and by placing waste in secondary containment, if possible (BMP).
- Prepare a manifest in accordance with the instructions found in the Appendix of §262, and sign the manifest only if a legal agreement has been reached with the client (see Section 4.3).
- Ensure that personnel shipping the waste and preparing the manifest are trained in DOT hazardous materials transport, and ship the waste in accordance with DOT regulatory requirements (Section 4.4)
- Ensure that the waste is shipped offsite at 90 days (§264.34).
- Dispose of hazardous waste at a permitted or authorized disposal facility (§261.5(f)(3) and §261.5(g)(3)).

5.3 Department of Transportation Requirements

The Hazardous Material Regulations (HMR) state that all hazardous wastes are hazardous materials because they are capable of posing an unreasonable risk to health, safety, and property when transported in commerce (49 CFR Parts 172-179). Preparation of hazardous materials for transportation is the responsibility of RETEC when we offer the material for transportation. A DOT-trained individual may offer a hazardous material for transportation if

it is in an approved packing or container and is:

- Properly classed
- Properly described
- In a properly manufactured and tested packaging or container
- In a packing marked in accordance with the HMR
- The package is in full compliance with Part 178 (173.22)(a)(1)-(4))

Attachment B provides shipping information for wastes that are commonly shipped from client sites. Always review the HMR to ensure that the shipping information associated with the waste is complete and accurate. Remember that only DOT trained individuals may ship hazardous waste or prepare hazardous waste for shipment.

5.4 Manifests

A generator who transports, or offers for transportation, hazardous waste for off-site treatment, storage, or disposal must prepare a Uniform Hazardous Waste Manifest. The manifest is a multiple-copy tracking document that tracks the chain of custody for the waste from the point it leaves the generator to final disposition at a hazardous waste disposal or recycling facility (Part 262, Subpart B). Once the chain is complete, the receiving facility returns a signed copy of the manifest to the generator. CESQG are not required to use a manifest when shipping their waste offsite, but may use a bill of lading for internal tracking purposes. A copy of the manifest form and instructions for completion are found in the Appendix to Part 262.

In general, client manifests should not be prepared or signed by RETEC employees. In some cases, a client may want a RETEC employee to act as their agent and sign a manifest. RETEC employees may only sign client manifests upon completion of a letter agreement with the client authorizing RETEC and RETEC employees to act as the client's agent in arranging for waste disposal or transportation . The client must agree to, sign, and return the letter before RETEC employees act as the client's agent or signing any documents on behalf of the client. Attachment A provides a template that may be used to meet the requirements of the authorization letter; you may call RETEC's Shared Services Risk Management for more assistance in preparation of the letter.

RETEC employees who prepare or sign a manifest as an agent for the client must have received Department of Transportation (DOT) hazardous materials shipping training in the last three years (49 CFR 172 -179). In no case may a RETEC employee prepare or sign a manifest without having received DOT training.

5.5 Land Disposal Restriction Forms

In addition to a manifest, you must complete a Land Disposal Restriction (LDR) Form to accompany a hazardous waste manifest. LDR forms communicate to the waste vendor that the hazardous waste doesn't meet the treatment standard required by the LDR regulations. It is the waste vendor's responsibility to ensure that after treatment the waste meets the standard before land disposal. A list of the LDR treatment standards is found in 40 CFR

268.40.

6.0 Quality Assurance/Quality Control

Every manifest signed as an agent for the client must be reviewed for accuracy by an experienced co-worker or supervisor. If additional questions arise, contact a RETEC EH&S coordinator for assistance with finding an internal RETEC expert.

7.0 Documentation

Copies of manifests that are signed as an agent for the client must be returned to the client for their records; copies should be retained in the project file for at least 5 years.

Attachment A

Conditions for Acting as Agent to Sign Manifests

Conditions for RETEC Acting as Agent to Sign Waste Manifests

The following information and indemnity provisions must be covered in a letter agreement with the Client authorizing RETEC and RETEC employees to act as the Client's agent in arranging for waste disposal or transportation. It is not sufficient merely to send the letter to the Client. The Client must agree to, sign, and return the letter before RETEC will commence to act as the Client's agent or sign any documents on behalf of the Client. The order that the information is presented is not as important, but the content of the letter is critical to limit RETEC's liability and protect the Client. Please feel free to have Corporate Risk Management (Charlotte Lawson (904) 726-8379) proofread any authorization letter you are preparing. Attached is a sample authorization letter.

Prior to undertaking to act as agent for a Client to arrange for and sign waste manifests and other documents relating to the transport and disposal of wastes, the following conditions and procedures must be followed:

1. **Document the phone telephone conversation, meeting, proposal, letter or situation upon which you will base the client authorization.**

2. **Detail the scope of work including the 1) origination site, 2) disposal site and 3) period of authorization, if any.**

EXAMPLE:

Per our conversation on Tuesday this letter is to confirm ABC Industries, Inc.'s (ABC) authorization to have RETEC Consulting Corporation (RETEC) act as agent for ABC Industries, Inc. for the purpose of arranging for the transport and disposal of hazardous wastes and other materials from the Green Acres MGP site to the Landsend Landfill for the period of March 3 through August 1, 2001, and signing on behalf of ABC waste manifests and other documents required for the transport and disposal of such materials.

3. **Expressly state the indemnification (Very Important!)**

It is recognized that ABC may assert that certain third persons or parties may rightfully bear the ultimate legal responsibility for any and all hazardous or nonhazardous substances, wastes, pollutants or contaminants which may currently be present on or have originated from the Green Acres MGP site. For the transport and disposal activities to be undertaken by RETEC as described above, it is agreed that RETEC shall under no circumstances be considered the generator of any hazardous or nonhazardous substances, wastes, pollutants or contaminants which may currently be present on or have originated from the Green Acres MGP site for the purposes of any environmental or other law or regulation. It is agreed that any hazardous materials, pollutants or contaminants generated or encountered in the performance of such activities by RETEC shall remain the property of ABC, shall remain the responsibility of ABC and shall be disposed of under a RCRA hazardous waste Generator Number obtained by and carried in name of ABC.

ABC agrees to defend, hold harmless and indemnify RETEC and its affiliates, and their officers, directors, employees, agents and subcontractors from and against any and all claims, actions, causes of action, liability, judgments, fines, penalties and costs (including attorney's fees) incurred by or to which any of them are subjected and which arise out of or related to the materials, wastes, pollutants or contaminants generated, originating from or transported from ABC's properties.

4. Ask for formal authorization (We cannot sign manifests or bills of lading at risk.)
If these conditions are acceptable, please sign and fax this authorization letter to my attention at [RETEC's office fax number].
Add signature, title & date lines at the bottom of letter.

5. Add deadline or schedule information, if applicable.
In order to schedule the waste disposal by March 3, 2001, we request a fax authorization by February 25.

6. Request an immediate call if there has been a misunderstanding.
If you have any questions or require more information about the planned waste disposal, please call me immediately at [RETEC's office phone number]. RETEC appreciates this opportunity to be of continued service to ABC Industries, Inc.

7. Remember that when signing any waste manifests or related documents to do so as agent for the Client.
For example, [your name], agent for ABC Industries, Inc.

HARD DATE

Mr. John Brown
ABC Industries, Inc.
1234 West Industrial Drive
Anytown, MO 17345

Dear Mr. Brown:

Per our conversation on Tuesday, this letter is to confirm ABC Industries, Inc.'s (ABC) authorization to have RETEC Consulting Corporation (RETEC) act as agent for ABC Industries, Inc. for the purpose of arranging for the transport and disposal of hazardous wastes and other materials from the Green Acres MGP site to the Landsend Landfill for the period of March 3 through August 1, 2001, and signing on behalf of ABC waste manifests and other documents required for the transport and disposal of such materials.

It is recognized that ABC may assert that certain third persons or parties may rightfully bear the ultimate legal responsibility for any and all hazardous or nonhazardous substances, wastes, pollutants or contaminants which may currently be present on or have originated from the Green Acres MGP site. For the transport and disposal activities to be undertaken by RETEC as described above, it is agreed that RETEC shall under no circumstances be considered the generator of any hazardous or nonhazardous substances, wastes, pollutants or contaminants which may currently be present on or have originated from the Green Acres MGP site for the purposes of any environmental or other law or regulation. It is agreed that any hazardous materials, pollutants or contaminants generated or encountered in the performance of such activities by RETEC shall remain the property of ABC, shall remain the responsibility of ABC and shall be disposed of under a RCRA hazardous waste Generator Number obtained by and carried in name of ABC.

ABC agrees to defend, hold harmless, and indemnify RETEC and its affiliates, and their officers, directors, employees, agents, and subcontractors from and against any and all claims, actions, causes of action, liability, judgments, fines, penalties and costs (including attorney's fees) incurred by or to which any of them are subjected and which arise out of or related to the materials, wastes, pollutants or contaminants generated, originating from or transported from ABC's properties.

If these conditions are acceptable, please sign and fax this authorization letter to my attention at (978) 369-2979. In order to schedule the waste disposal by March 3, 2001, we request a fax authorization by February 25. If you have any questions or require more information about the planned waste disposal, please call me immediately at (978) 371-1422. RETEC appreciates this opportunity to be of continued service to ABC Industries, Inc.

Sincerely,

The RETEC Group, Inc.

Richard Manager
Project Manager

Authorizing Signature for ABC Industries, Inc

Name, Title (print)

Date

Attachment B

Waste Shipping Information for Common Wastes

Air Stripper Packing

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262.34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Air Stripper Packing TCLP Benzene > 0.5 mg/L, Lead > 5 mg/L	Yes	Yes	Haz Waste Manifest	Hazardous Waste Solid, N.O.S., 9, NA3077, PGIII (Lead, Benzene)	Yes	Yes	Yes	Yes	Yes*
Air Stripper Packing TCLP Lead < 5 mg/L Benzene < 0.5 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Fuel Oil

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262.34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Fuel Oil for Disposal Flashpoint < 140F, TCLP Benzene < 0.5 mg/L	Yes	Yes	Haz Waste Manifest	Waste Fuel Oil Mixture, 3, NA1993 PGIII	Yes	Yes	Yes	Yes	Yes*
Fuel Oil for Recycling Flashpoint > 200F, TCLP Benzene, <0.5 mg/L	No	Yes	Haz Materials of Lading	Fuel Oil Mixture, 3, NA1993, PGIII (Benzene)	No	No	Yes	No*	Yes*
Fuel Oil Flashpoint > 200F, TCLP Benzene < 0.5 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Fuel Oil and Water Mixtures

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Mostly Fuel Oil Flashpoint < 140F, TCLP Benzene > 0.5 mg/L	Yes	Yes	Haz Waste Manifest	Waste Fuel Oil Mixture, 3, NA1993, PGII (Benzene)	Yes	Yes	Yes	Yes	Yes*
Mostly Water, (Fuel Oil portion recycled) Flashpoint 141-200F, TCLP Benzene > 0.5 mg/L	No	Yes	Haz Materials Bill of Lading	Combustible Liquid, N.O.S., NA1993 PGIII (Fuel Oil)	No	No	Yes	No	Yes*
Mostly Water Flashpoint > 200F, TCLP Benzene < 0.5 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Gasoline

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Gasoline for Disposal Flashpoint < 140F TCLP Benzene > 0.5 mg/L	Yes	Yes	Haz Waste Manifest	Waste Gasoline Mixture, 3, UN1203, PGII (Benzene)	Yes	Yes	Yes	Yes	Yes*
Gasoline for Recycling Flashpoint < 140F, TCLP Benzene > 0.5 mg/L	No	Yes	Haz Materials Bill of Lading	Gasoline Mixture, 3, UN1203, PGII	No	No	Yes	Yes*	Yes*

* With Exceptions

Gasoline and Water Mixtures

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Mostly Gasoline Flashpoint >140F, TCLP Benzene > 0.5 mg/L	Yes	Yes	Haz Waste Manifest	Waste Gasoline Mixture, 3, UN1203, PGll (Benzene)	Yes	Yes	Yes	Yes	Yes*
Mostly Water with Gasoline Flashpoint < 140F, TCLP Benzene < 0.5 mg/L, TCLP Lead > 5.0 mg/L	No	Yes	Haz Waste Manifest	Waste Flammable Liquid, N.O.S., 3, UN1993, PGlll (Lead, Benzene)	Yes	Yes	Yes	Yes	Yes*
Mostly Water Flashpoint 141-200F, TCLP Benzene < 0.5 gm/l	No	Yes	Haz Materials Bill of Lading	Combustible Liquid, N.O.S., NA1993 PGlll (Gasoline)	No	No	Yes	No*	Yes*
Mostly Water Flashpoint > 200F, TCLP Lead > 5.0 mg/L, TCLP Benzene > 0.5 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Oil/Water Separator Sludge

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
O/W separator sludge TCLP Benzene < 0.5 mg/L TCLP Cresol >200 mg/L, TCLP Lead > 5 mg/L, Flashpoint >200F	Yes	Yes	Haz Waste Manifest	Hazardous Waste Liquid, N.O.S., 9, NA3082, PGIII (Lead, Cresol)	Yes	Yes	Yes	Yes	Yes*
O/W separator sludge Flashpoint 141-200F, TCLP Benzene < 0.5 mg/L TCLP Lead < 5 mg/L	No	Yes	Haz Materials Bill of Lading	Combustible Liquid N.O.S., NA1993 PGIII (Oil)	No	No	Yes	No*	Yes*
O/W separator sludge Flashpoint > 200F TCLP Lead < 5 mg/L, TCLP Benzene < 0.5 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

PPE, Sorbents, Trash

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262.34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
PPE and Trash TCLP Benzene > 0.5 mg/L,TCLP Lead < 5.0 mg/L	Yes	Yes	Haz Waste Manifest	Hazardous Waste Solid, N.O.S., 9, NA3077, PGIII (Benzene)	Yes	Yes	Yes	Yes	Yes*
PPE and Trash TCLP Lead < 5.0 mg/L, TCLP Benzene < 0.5 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Soil and Debris

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262.34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
AST gasoline spill/release clean-up (soil and debris) Benzene > 0.5 mg/L	Yes	Yes	Haz Waste Manifest	Hazardous Waste Solid, N.O.S., 9, NA3077, PGIII (Benzene)	Yes	Yes	Yes	Yes	Yes*
UST gasoline spill/release clean up (soil and debris) Benzene > 10 mg/L	No	Yes	Haz Materials Bill of Lading	Environmentally Hazardous Substances, Solid, N.O.S., 9, UN3077, PGIII (Benzene)	No	No	Yes	Yes	Yes*
UST gasoline spill/ TCLP Benzene < 5 mg/L, TCLP Lead = 2 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Spent Acid
Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Spent Acid (HCL) pH=1, TCLP Benzene < 0.5 mg/L TCLP Lead < 5 mg/L	Yes	Yes	Haz Waste Manifest	Waste Hydrochloric Acid Solution, 8, UN1789, PGII	Yes	Yes	Yes	Yes	Yes*
Spent Acid (HCL) pH=3, TCLP Benzene < 0.5 mg/L TCLP Lead < 5 mg/L	No	No	Haz Materials Bill of Lading	Hydrochloric Acid Solution, 8, UN1789 PGIII	No	No	Yes	Yes	Yes*

* With Exceptions

Spent Carbon

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Spent Carbon TCLP Benzene > 0.5 mg/L	Yes	Yes	Haz Waste Manifest	Hazardous Waste Solid, N.O.S., 9, NA3077, PGIII (Benzene)	Yes	Yes	Yes	Yes	Yes*
Spent Carbon TCLP Benzene < 0.5 mg/L Flashpoint >141-< 200F	No	Yes	Haz Materials Bill of Lading	Combustible liquid, N.O.S., NA1993, PGIII (Gasoline) Domestic Transport	No	No	Yes	No*	Yes*
Spent Carbon TCLP Benzene - ND, Flashpoint > 200F	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Waste Oil

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Waste Oil TCLP Benzene > 0.5 mg/L, Flashpoint > 200F	Yes	Yes	Haz Waste Manifest	Hazardous Waste Liquid, N.O.S., 9, NA3082, PGIII (Oil, Benzene)	Yes	Yes	Yes	Yes	Yes*
Waste Oil for Disposal or Recycling Flashpoint 141-200F	No	Yes	Haz Materials Bill of Lading	Combustible Liquid, N.O.S., NA1993, PGIII (Oil)	No	No	Yes	No*	Yes*
Waste Oil for Recycling Flashpoint >200F, TCLP Lead > 5.0 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

WASTE OIL AND WATER MIXTURES

Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
Waste oil/water TCLP Benzene > 5 mg/L, Flashpoint > 200F	Yes	Yes	Haz Waste Manifest	Hazardous Waste Liquid, N.O.S., 9, NA3082, PGIII (Oil, Benzene)	Yes	Yes	Yes	Yes	Yes*
Waste oil/water for disposal or recycling FP 141-200F	No	Yes	Haz Materials Bill of Lading	Combustible Liquid, N.O.S., NA1993 PGIII (Oil)	No	No	Yes	No*	Yes*
Waste Oil-recycled Flashpoint > 200F TCLP Lead > 5.0 mg/L	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions

Well Purge /Development Water
Packaging, Marking, Labeling and Shipping

Example Waste	RCRA Regulated	DOT Regulated	Shipping Paper (49 CFR Subpart C)	Shipping Name (49 CFR 172.101)	LDR Form (40 CFR 268.7)	RCRA Label (40 CFR 262,34)	DOT Marking (49 CFR 172 Subpart D)	DOT Label (49 CFR 172 Subpart E)	Placard (49 CFR 172 Subpart F)
UST Groundwater TCLP Lead > 5 ppm	Yes	Yes	Haz Waste Manifest	Hazardous Waste Liquid, N.O.S., 9, NA3082, PGll (Lead)	Yes	Yes	Yes	Yes	Yes*
UST Groundwater TCLP Benzene > 10 mg/L	No	Yes	Haz Materials Bill of Lading	Environmentally Hazardous Waste Substance, 9, UN3082 PGlll (Benzene)	No	No	Yes	Yes	Yes*
UST Groundwater TCLP Benzene < 0.5 mg/L Flash Point > 200F	No	No	Straight Bill of Lading	Non-Regulated Material	No	No	No	No	No

* With Exceptions